CISC-365
2009
Lab # 5
Week of October 12

The Cut-throat Investment Management Company was so satisfied with your performance a few weeks ago that they have retained your services again. This time, rather than creating software to help decide which employees to fire, they want you to create and implement an algorithm to do very simple stock price analysis.

The mantra of successful investing is "buy low, sell high". Our goal is retro-analysis: given a series of daily prices for a given stock, we want to determine the day on which we should have bought and the day we should have sold, in order to maximize our profit.

More formally, given a sequence of n integers representing the daily closing price for a particular stock starting with p_0 (the price for day 0) and ending with p_{n-1} (the price for day n-1), we want to find p_i and p_j, where $i < j$, such that $p_j - p_i$ is as large as possible.

For example, if the daily prices are
3 2 5 4 3 4 7 5 1 4
then the maximum profit would result from buying on day 1 (price 2) and selling on day 6 (price 7)
If the daily prices are
4 8 1 3 6 2
then the maximum profit would result from buying on day 2 and selling on day 4.

The naïve algorithm for this problem would compare each day's price to all the later prices in the list, and keep track of the greatest profit seen. This algorithm runs in $O(n^2)$ time, of course – make sure you understand why.

Your goal is to find a better algorithm, using the Divide and Conquer approach. Think carefully about how you can do this before looking at Part 2 of this lab:

http://research.cs.queensu.ca/home/cisc365/2009F/Labs/Lab_5/Lab_5_Stocks_Part2.pdf